

CLAIMS

1. A detector assembly, comprising:
 - a support element configured to attach the detector assembly to a chamber wall that separates a lower pressure region and a higher pressure region;
 - a first capacitor plate and a second capacitor plate, a surface of the second capacitor plate being spaced apart from a surface of the first capacitor plate to define a capacitor gap, the first capacitor plate being positioned to be inside the lower pressure region when the detector assembly is attached to the chamber wall, the second capacitor plate being supported by the support element through insulating couplings; and
 - means for reducing mechanical load on the insulating couplings between the second capacitor plate and the support element, the reduced mechanical load including load caused by a pressure difference between the lower and higher pressure regions.
2. The detector assembly of claim 1, wherein:
 - the means for reducing the mechanical load is configured to couple the second capacitor plate and a circuit board.
3. The detector assembly of claim 2, wherein:
 - the second capacitor plate is configured to receive a fastener to attach the circuit board to the detector assembly; and
 - the means for reducing the mechanical load is configured to couple the fastener and the circuit board and reduce a load caused by the circuit board.
4. The detector assembly of claim 3, wherein:
 - the second capacitor plate includes a post to receive the fastener.
5. The detector assembly of claim 3, wherein:
 - the second capacitor plate is positioned to separate the lower and higher pressure regions such that a pressure difference between the pressure regions causes a load on the second capacitor plate; and
 - the means for reducing the mechanical load is configured to apply a counter-load

through the fastener to the second capacitor plate to compensate the load caused by the pressure difference between the lower and higher pressure regions.

6. The detector assembly of claim 5, wherein the fastener is adjustable to select the counter-load applied to the second capacitor plate.
7. The detector assembly of claim 1, wherein:
 - the means for reducing the mechanical load is attached to the support element and positioned to separate the lower and higher pressure regions such that the second capacitor plate is entirely inside the lower pressure region.
8. The detector assembly of claim 1, wherein:
 - the means for reducing the mechanical load is configured to provide an electrical coupling path from the second capacitor plate to a circuit detecting voltage of the second capacitor plate.
9. The detector assembly of claim 1, wherein the lower pressure region includes substantially a vacuum and the higher pressure region has substantially atmospheric pressure.
10. The detector assembly of claim 1, further comprising:
 - a conductor to connect the first capacitor plate to a multipole rod assembly inside the lower pressure region.
11. A detector assembly, comprising:
 - a support element configured to attach the detector assembly to a chamber wall that separates a lower pressure region and a higher pressure region;
 - a first capacitor plate positioned to be inside the lower pressure region when the detector assembly is attached to the chamber wall;
 - a second capacitor plate having a surface spaced apart from a surface of the first capacitor plate to define a capacitor gap, the second capacitor plate being attached to the support element and positioned to separate the lower and higher pressure regions and

being configured to receive a fastener to attach a circuit board to the detector assembly;
and

a flexible coupling element to couple the fastener and the circuit board.

12. The detector assembly of claim 11, wherein the flexible coupling element is a spring.
13. The detector assembly of claim 11, wherein the flexible coupling element is a flexible washer.
14. The detector assembly of claim 11, wherein the flexible coupling element includes spaced apart fingers extending from a peripheral flange towards the interior of a region defined by the flange.
15. The detector assembly of claim 11, wherein the flexible coupling element is configured to provide an electrical coupling path between the circuit board and the second capacitor plate.
16. A detector assembly, comprising:
 - a support element configured to attach the detector assembly to a wall separating a lower pressure region and a higher pressure region in a mass spectrometer;
 - a first capacitor plate and a second capacitor plate that has a surface spaced apart from a surface of the first capacitor plate to define a capacitor gap, the first capacitor plate being positioned to be inside the lower pressure region, the second capacitor plate being supported by the support element; and
 - a sealing element attached to the support element and positioned to separate the lower and higher pressure regions such that the second capacitor plate is entirely inside the lower pressure region.
17. The detector assembly of claim 16, wherein the second capacitor plate and the sealing element define an enclosure, the assembly further comprising:
 - one or more pressure channels to equalize a pressure inside the enclosure and the lower pressure region.

18. The detector assembly of claim 16, wherein:
 - the sealing element includes a metal portion to provide an electrical coupling path from the second capacitor plate to a circuit detecting a voltage of the second capacitor plate.
19. The detector assembly of claim 16, wherein:
 - the sealing element is configured to receive a fastener to attach a circuit board to the detector assembly.
20. An assembly, comprising:
 - a support element configured to attach to a wall **that** separates a lower pressure region and a higher pressure region;
 - a part attached to the support element, the part being positioned to separate the lower and higher pressure regions, and configured to attach a circuit board to the assembly; and
 - a flexible coupling element to couple the part and the circuit board.
21. The assembly of claim 20, further comprising:
 - a fastener coupled to the part, the flexible coupling element coupling the part and the circuit board through the fastener.
22. The assembly of claim 21, wherein the part is a part of a detector, pusher or reflectron of a time of flight mass analyzer.
23. An assembly, comprising:
 - a circuit board;
 - a component; and
 - one or more flexible coupling elements attaching the component to the circuit board such that the flexible coupling elements decrease strain on the component that is caused by deformations of the circuit board.
24. The assembly of claim 23, wherein the component includes a metal film resistor.